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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,300	12/12/2003	Hong-Da Liu	MR2707-51	2519
4586	7590	08/09/2005	EXAMINER	
ROSENBERG, KLEIN & LEE 3458 ELLICOTT CENTER DRIVE-SUITE 101 ELLICOTT CITY, MD 21043			SCHECHTER, ANDREW M	
			ART UNIT	PAPER NUMBER
			2871	

DATE MAILED: 08/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/733,300

Applicant(s)

LIU, HONG-DA

Examiner

Andrew Schechter

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 18-22 is/are pending in the application.
- 4a) Of the above claim(s) 4 and 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5-8, 18, 20 and 22 is/are rejected.
- 7) ☒ Claim(s) 3 and 19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. Figure 3A should be designated by a legend such as --Prior Art-- or --Related Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "In-plane switching liquid crystal display having nanometer scale roughness".

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-3, 5-8, 18-20, and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "a reflective surface with a nanometer scale roughness for light scattering", and claim 18 similarly recites "nanometer scale roughness". The phrase "nanometer scale" does not appear to have an explicit definition. The examiner understands "nanometer scale roughness" [see Fig. 3 and accompanying discussion on p. 8] to be roughness on the scale of about 5-50 nm in height and about 20 nm in width, that is, roughness having dimensions on the order of at most tens of nanometers. Does the applicant agree with this interpretation of "nanometer scale roughness"?

The prior art such as *Miyawaki*, U.S. Patent No. 5,708,486, teaches that when the surface roughness of a reflective electrode is less than 100 nm, and preferably less than 50 nm, this provides a better reflection surface, and less scattered light, in contrast to a surface roughness of 150-200 nm or more (*Miyawaki* teaches that the increased roughness is appropriate for a shading film). Furthermore, the range disclosed by the applicant (5-50 nm in height) is much less than the wavelengths of light in the visible, so it would make sense that there would be little scattered light due to this roughness. So, rather than being for light scattering, the nanometer scale roughness reflective surface recited by claim 1 appears to be what you get when you try to make a very good reflector which scatters very little. Is this an accurate assessment? Is the seeming contradiction merely a matter of degree in evaluating the desired amount of light scattering from mirror reflectors? For examining purposes, the examiner will follow

Miyawaki's teaching that using a surface roughness such as is recited in the claims produces a very reflective surface with relatively little light scattering.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 5, 8, 18, 20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kim*, U.S. Patent No. 6,177,970 in view of *Ohmuro et al.*, US 2003/0128317 in view of *Miyawaki et al.*, U.S. Patent No. 5,708,486.

Kim discloses [see Figs. 6 and 7] a pixel for an in-plane switching liquid crystal display comprising a first structure [210, 40, 310] on a substrate [10], a second structure [the TFT - 60, etc.] on a first part [210] of the first structure having a switch device thereof, a liquid crystal layer [110] above the second structure and a second part [40, 310] of the first structure, and a third structure [100] on the liquid crystal layer.

Kim does not disclose the first structure having a reflective surface. *Ohmuro* discloses [see Fig. 21, paragraph 0102] an analogous in-plane switching pixel, and discloses that the analogous electrodes [21, 31] are reflective and serve as a reflective region (with the gaps between them serving as the transmissive region). It would have been obvious to one of ordinary skill in the art at the time of the invention to do so in the

device of *Kim*, motivated by the desire to have a transfective device, which could be used in both light and dark environments with power efficiency.

Ohmuro does not disclose that the reflective electrodes have a nanometer scale roughness for light scattering and contrast enhancement. *Miyawaki* discloses that giving an analogous reflective electrode nanometer scale roughness (100 nm or less, preferably 50 nm or less) produces a good reflective display with improved contrast [col. 3, lines 7-32]. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to have nanometer scale roughness for the reflective electrodes, motivated by this teaching of *Miyawaki*. Claim 1 is therefore unpatentable.

Miyawaki teaches achieving the 100 nm surface roughness by forming an underlying insulating layer with a smooth surface and then forming thereon an Al-based film by sputtering under high vacuum [col. 3, lines 20-24]. These would be the micro scattering layer and reflective layer conformal to the micro scattering layer recited in claim 2, so claim 2 is also unpatentable. In *Kim*, the second part [40, 310] comprises a plurality of reflectors (which would have the reflective surface with nanometer scale roughness as discussed above), so claim 5 is also unpatentable. The area ratio of the first (transparent) region to the second (reflective) region is in the range between 10% and 400% [see Fig. 6; even were it not, the examiner takes official notice that optimizing this ratio is well-known and would have been obvious to one of ordinary skill in the art at the time of the invention, to match the reflective-transmissive display to its intended light environment], so claim 8 is also unpatentable.

Considering additional limitations of claim 18, the reflective layer is made of a same metal as the gate of the TFT, there is a passivation [50] covered on the plurality of reflectors [the examiner interprets the claim language, in particular the awkward phrase "covered on", to allow the reflectors to be free of the passivation at regions other than the contact holes (where of course the reflectors cannot be covered with the passivation)], and a conductor [720] on the passivation and passing therethrough for connected to one of the plurality of reflectors [see Fig. 6]. Claim 18 is therefore unpatentable as well.

As above the micro scattering layer comprises an insulator having the top surface with the nanometer scale roughness, so claim 20 is also unpatentable. Claim 22 is analogous to claim 8, so it is also unpatentable.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Kim*, U.S. Patent No. 6,177,970 in view of *Ohmuro et al.*, US 2003/0128317 in view of *Miyawaki et al.*, U.S. Patent No. 5,708,486 as applied to claim 5 above, and further in view of *Asada et al.*, U.S. Patent No. 5,745,207.

Kim does not disclose that the plurality of reflectors are bent. *Asada* discloses [see Fig. 2] an analogous LCD in which the analogous electrodes are bent. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so in the device of *Kim*, motivated by *Asada's* teaching that thereby a problem of coloring at different viewing angles is compensated for [see abstract]. Claim 6 is therefore unpatentable.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Kim*, U.S. Patent No. 6,177,970 in view of *Ohmuro et al.*, US 2003/0128317 in view of *Miyawaki et al.*, U.S. Patent No. 5,708,486 as applied to claim 5 above, and further in view of *Jones et al.*, U.S. Patent No. 5,949,506.

The above device does not disclose the upper substrate having scattering film, color filter, and polarizer, in that order. *Jones* discloses [see Fig. 7] an upper substrate having scattering film [61], color filter [65], and polarizer [19] in that order, and it would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by the desire to provide a color display, to supply polarized light to the liquid crystal, and to diffuse the light to improve the display quality. (The different positions of the scattering film relative to the color filter are art-recognized equivalents, as seen by comparing Figs. 6-8.) Claim 7 is therefore unpatentable.

Allowable Subject Matter

9. Claims 3 and 19 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not disclose the device of claims 3 and 19, in particular the additional limitation that the micro scattering layer comprises a conductor on the substrate and an insulator on the conductor with the nanometer scale roughness.

Miyawaki, for instance, only discloses having an insulator on the substrate with the nanometer scale roughness. Claims 3 and 19 would therefore be allowable if rewritten appropriately, assuming the 35 U.S.C. 112 issues are resolved appropriately.

Election/Restrictions

11. Applicant's election without traverse of Group I, claims 1-8 and 18-22, and of Species A, claims 3, 11, and 19, in the reply filed on 9 May 2005 is acknowledged.

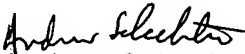
12. Claims 4 and 21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention or species, there being no allowable generic or linking claim. Election was made without traverse in the reply filed on 9 May 2005.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Andrew Schechter
Primary Examiner
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6 August 2005